PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

To:

Assistant Commissioner for Patents
United States Patent and Trademark Office
Box PCT
Washington, D.C.20231
ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

Date of mailing: 05 October 2000 (05.10.00)	
International application No.: PCT/GB00/00900	Applicant's or agent's file reference: A25710
International filing date: 10 March 2000 (10.03.00)	Priority date: 30 March 1999 (30.03.99)
Applicant: THOMAS, Gregory, Derek et al	

1. The designated Office is hereby notified of its election made:

[X] in the demand filed with the International preliminary Examining Authority on:

21 August 2000 (21.08.00)

[ ] in a notice effecting later election filed with the International Bureau on:

2. The election [X] was

[ ] was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

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14

PATENT COOPERATION TREATY

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REC'D 06 AUG 2001

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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
A25710 WO		
International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/GB00/00900	10/03/2000	30/03/1999
International Patent Classification (IPC) or national classification and IPC G06F3/12		
Applicant BRITISH TELECOMMUNICATIONS PUBLIC LIMITED COMPANY		

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1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 6 sheets, including this cover sheet.

   ☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the report
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations suporting such statement
   - VI ☐ Certain documents cited
   - VII ☒ Certain defects in the international application
   - VIII ☒ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
21/08/2000	02.08.2001
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Gordon, M Telephone No. +49 89 2399 2901

Form PCT/IPEA/409 (cover sheet) (January 1994)

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB00/00900

I. Basis of the report

1. With regard to the **elements** of the international application *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17))*:
Description, pages:

1-9 as originally filed

Claims, No.:

1-11 as originally filed

Drawings, sheets:

1-5 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:

☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

   (Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-11
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-11
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-11
	No:	Claims	

2. Citations and explanations
   see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:
see separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:
see separate sheet

Re Item V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Reference is made to the following documents:

   D1: US-A-5 802 260 (Shiotani Takahiro et al) 1 September 1998 (1998-09-01)
   D2: WO 96 39656 A (Apple Computer) 12 December 1996 (1996-12-12)

2. The present international application is directed to reducing the workload on a network server by delegating control of printing tasks to the client. To achieve this, according to claim 1, the client (first computer) sends a print request identifying a printer or an application program to the server (second computer). The server associates the identifiers with a network address port and sends stored data for the printing task to the network address of the client at the asociated port. The client receives the data at the port and sends it to the printer or application program associated with the receiving port according to its own stored associations. In this way the client can maintain up to date configurations (printer details, locations and driver programs) of the printers on the network locally, so that the server does not need to maintain these lists.

3. Neither of the documents cited in the international search report is particularly relevant to the present application.

3.1 The closest cited prior art document D1 does not provide any hints to suggest the solution described above, and is in fact directed to solving a different problem entirely. The problem solved in D1 is to ensure that, when a printing job on a network is interrupted for whatever reason (interruption by the user, printer malfunction) it can be resumed on the same printer or a different one without interference from another print job being run on the continuation printer.

3.2 The other cited document D2 is also directed to solving a different problem, namely, to reducing network congestion caused through the repeated polling of a busy print queue server by clients attempting to run print jobs on that server. D2 achieves this through a dynamic scheme for managing port negotiations.

4. Since D1 and D2 disclose only the subject-matter defined in the first three lines of claim 1 and neither suggests the remaining subject-matter in the claim, it consequently exhibits both novelty and inventive step.

5. Claims 2 to 8 are directly or indirectly dependent on claim 1 and so also exhibit both novelty and inventive step.

6. Independent claims 9 to 11 define subject-matter corresponding in essence to that of claim 1 (but see section VIII below); they also exhibit novelty and inventive step.

7. Hence the subject-matter claimed in the present international application satisfies the requirements of Article 33 PCT in regard to novelty and inventive step.

Re Item VII

Certain defects in the international application

1. Claim 1 is not in the two-part form in accordance with Rule 6.3(b) PCT, which in the present case would have been appropriate, with those features known in combination from the closest prior art (see Section V, paragraph 4, above) being placed in a preamble (Rule 6.3(b)(i) PCT) and with the remaining features being included in a characterising part (Rule 6.3(b)(ii) PCT).

1.1 This requirement would have been satisfied by inserting the words "characterised by" in the third line of claim 1, after the word "method".

1.2 The applicant has given no opinion as to why the two-part form would not be appropriate, nor has the applicant ensured that it is clear from the description which features of the subject-matter of the independent claims are already known in combination from the closest prior art document D1 (PCT Guidelines, III-2.3a.)

2. The features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).

3. The description does not conform to an acceptable set of claims as required by

Rule 5.1(a)(iii)PCT.

4. Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in documents D1 and D2 (see Section V, paragraphs 3 to 4, above) is not mentioned in the description, nor are these documents identified there.

Re Item VIII

Certain observations on the international application

1. Although method claims 1, 9 and 10 have been drafted as separate independent claims, nevertheless they seem to relate effectively to the same subject-matter and to differ from each other only with regard to the definition of the subject-matter for which protection is sought and/or in respect of the terminology used for the features of that subject-matter. In particular,

1.1 Claim 9 should have been made dependent on claim 1, since it encompasses the subject-matter defined in that part of claim 1 relating to the first computer (the client), and since it introduces the further limiting feature of displaying data.

1.2 Claim 10 should also have been made dependent on claim 1, since it encompasses the subject-matter defined in that part of claim 1 relating to the second computer (the server), and since it introduces the further limiting feature of sending an identification of the type of data being sent in addition to the data itself.

1.3 These claims therefore lack conciseness. Moreover, lack of clarity of the claims as a whole arises, since the number of independent claims makes it difficult, if not impossible, to determine the matter for which protection is sought, and places an undue burden on others seeking to establish the extent of the protection. Hence method claims 1, 9 and 10 do not satisfy the requirements of Article 6 PCT.

2. To overcome this objection, it would have been appropriate to file a set of claims defining the relevant subject-matter in terms of a single independent claim in each category (that is, apparatus and/or method and/or data carrier) followed by dependent claims covering those features which are merely optional (Rule 6.4 PCT).

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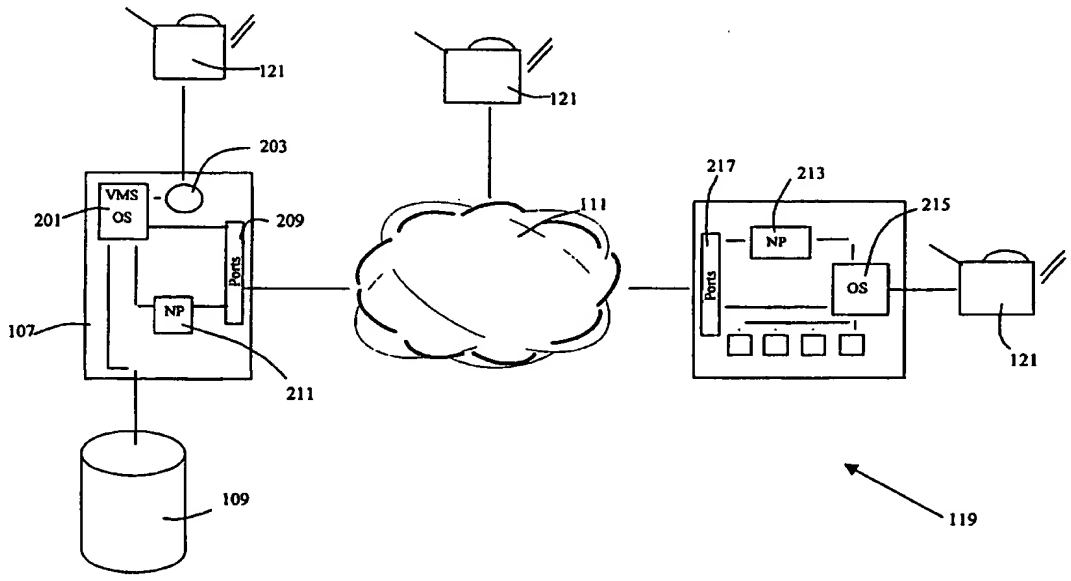
(54) Title: NETWORK PRINTING METHOD IN APPARATUS



(57) Abstract

A method and apparatus for carrying out printing requests is disclosed for a client/server networked computing environment. Where the client computers are arranged to simply receive data in response to requests and carry out relatively little processing on the received data the client computer is termed "Thin". In such an environment print requests from a client computer to a server computer are executed under the control of the server computer. In a large network of computer with many printers this results the maintenance of printer configuration data being a large task. The invention alleviated this problem by enabling the client computer to take control of the printing task.

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NETWORK PRINTING METHOD IN APPARATUS

The present invention relates to the performance of printing operations in a computer network. The invention is particularly applicable to printing operations carried out in a client/server computer environment.

Networked computer systems are known in which the computers connected by the network can be divided into two categories. The first category are the server computers which are often used to store databases and to run database management programs to allow access and manipulation of the data in the database. The second category are the client computers which, under the control of a user, access the data stored by the server computer and enable operations on that data such as editing, analysis, downloading or printing.

Within the category of client/server computer architecture there are a number of sub-classes. These classes generally distinguish various client/server architectures depending on the distribution of processing between the client computers and the server computers. One such class is commonly called "Thin Client" and refers to a situation in which, in response to requests for information from the client computer, the application programs on the server computer carry out most of the data processing. In other words, the client computer allows a user to make requests for information, the server computer then carries out the necessary processing to produce the data and passes back the results to the client computer for viewing.

In some such thin client/server arrangements, the server computer holds configuration data and identification/location data for every printer connected to the network. When a print request is made by the user via the client computer, the printing task is carried out under the control of the server computer.

One problem with performing printing operations over a large network of computers is that of managing the configuration data and identification/location data for the printers on the network. For example, printers or client computers may move their physical positions thereby requiring changes to be made to the appropriate

location data. Printers may be upgraded resulting in a change in configuration data and perhaps even the network address of the printer. The resulting overhead in managing the printer data so as to be able to send print jobs to a printer that is appropriate for the physical location of the client computer is costly and therefore undesirable. In some situation, there may be no appropriate printer in the proximity of the client computer making the physical printing of material impossible.

According to a first aspect of the present invention there is provided a method of processing data for performing a printing operation in response to a print request made by a first computer to a second computer in a network of computers, the method comprising the steps of:

i) at said second computer:

a) accessing stored data associating one or more printer identifiers and/or application program identifiers with each member of a set of network address ports;

b) receiving a print request from said first computer, said request comprising an identification of one of said stored printer identifiers or application program identifiers;

c) identifying the network address of said first computer; and

d) sending data required for said print request to the network address of the first computer, using the port associated with the printer identifier or application program identifiers identified in the request; and

ii) at said first computer:

a) accessing stored data defining an association between each member of the set of network address ports and a printer and/or application program; and

b) in response to data being received via one of said predetermined ports, sending the received data to the printer or application program associated, in accordance with said stored data, with the network port from which the data was received.

This method of processing data for printing removes the need for the server computer to be configured with the details, locations and driver programs for all the printers on the network. In addition, when the print request results in a particular application program being used to open a file and present it to the user then this provides further

advantages. For example, it avoids the need for the user to have any printing facilities available (such as a mobile user connected to a network by a GSM phone but not in the proximity of a printer) or removes the delay of physically printing the document. The invention is also advantageous when the network address of a client computer changes each time it is logged on to a network, for example, using the dynamic host configuration protocol (DHCP).

Embodiments of the present invention are described below with reference to the accompanying drawings in which:

Figure 1 shows a schematic view of a network of computers controlling and monitoring a telecommunications system;

Figure 2 is a diagrammatic representation of a client computer connected to a server computer in the network shown in Figure 1;

Figure 3 is a diagrammatic representation of data stored on the client and server computers shown in Figure 3;

Figure 4 is a flow diagram showing the processing carried out by the server computer shown in Figure 2; and

Figure 5 is a flow diagram showing the processing carried out by the client computer shown in Figure 2;

Figure 1 shows a schematic view of a large networked computer system 101 that is arranged to monitor and control a telephone system 103 via a telephone exchange 105. The telephone exchange 105 is connected to a server computer 107 that is arranged to control and monitor the activity of the telephone exchange 105. The server 107 is connected to a database 109 that it uses to store collected data and control programs. The server computer 107 is connected to a wide area network (WAN) 111 along with a further server computer 113 connected to a corresponding storage device 115. The WAN 111 is also connected to two local area networks (LAN) 117. Server computers 119 and printers 121 are connected variously to the LANs 117 and the WAN 111. The computers 107, 113, 119 are arranged to communicate with each other via the networks 111, 117 using IP network protocol such as TCP/IP (other alternative IP protocols include UDP/IP and RTP/IP). In addition, any one of the printers 121 may be arranged to carry out printing operations in

accordance with instructions sent from any one of the computers 107, 113, 119 connected to the networks 111, 117.

As will be known by those skilled in the art, each device in an IP network is assigned a unique address (IP address) that uniquely identifies the device in the network 101. In addition, each IP address is divided into approximately sixty four thousand port numbers each enabling a notionally separate network connection. An IP address is denoted by a string of numbers delineated with periods (or full stops) (e.g. 123.2.154.209) and a port number for a particular address is appended to the IP address after a colon (e.g. 123.2.154.209:63295 where 63295 is the port number).

The server computers 107, 113 are conventional computers running the VMS operating system while the client computers 119 are PC's with conventional operating systems such as Windows. The server computers 107, 113 and the client computers also run appropriate (and conventional) Client/Server software that enables the client computers to access the control and monitoring programs and data an the server computers 107, 113 via the networks 111, 117. This enables users to print reports or other documents using one of the printers 121 attached to the networks 111, 117.

Figure 2 shows parts of the network 101 in further detail. The operating systems and application programs that are resident on the server 107 and the client 119 are shown as functional blocks. The server 107 is running the VMS operating system that includes a print spooler 203. The print spooler 203 is a conventional program that handles printing tasks for the operating system. Such spoolers have a file as their input along with a print command that details the printing task (e.g. number of copies). Once these inputs have been received, the print spooler communicates with the assigned printer 121 to produce the requested output.

The resident software includes a further program 211 herein termed the network printing program. The program 211 also handles printing tasks but instead of sending a file and print command to a printer, is arranged to send data to the client computer from which the print request was initiated in a manner that will be explained in further detail below.

The sever computer 107, as part of the normal log-on procedure, detects when a user logs on to the server 107 via the client computer 119 and stores the IP address of the client computer 119 in a file 301 (see Figure 3) that is specific to the

user. In addition to the IP address 203, the file 301 also contains a reference 305 to a corresponding settings file 307 for the particular user. The settings file 307 comprises four entries each having three fields, the first field for printer or application program name, the second field for an IP address and the third field for an IP port number.

The functions of the network printing program 211 will now be described further with reference to Figure 4. In response to the reception of a print request from the client 119, at step 401 the network printing program 211 opens the settings file 307, extracts the first field from each entry and presents these to the user as the choice of printers available for the print request. In response to the user's choice, at step 403 the network printing program 211 extracts the corresponding second and third fields from the chosen entry (filling in the blank second field from the IP address entry in the data file 301). At step 405 the network printing program 211 opens a network connection for the identified IP address and port number. At step 407, if the user has chosen the default entry (as opposed to a printer entry) in step 403 above, the network printing program 211 inserts a line in the file (containing the data to be printed) that recites the file extension (e.g. "doc" for a word-processing file or "txt" for a text file). If any conversion is required between the server file format and the client file format then this is carried out at step 409. Then, at step 411 the network printing program 211 sends the file to the client computer 119 and, at step 413, closes the IP connection.

With reference to Figure 2, the client computer 119 has a corresponding network printing program 213 that is in communication with the operating system 215 and runs as a background process monitoring selected ones of the network ports 217. The network printing program 213 is started up automatically when the client computer 119 is switched on and refers to an initialisation file 309 (shown in Figure 3) to identify the IP ports that should be monitored.

The functions of the network printing program 213 will now be described with reference to Figure 5. At step 501 the program 213 monitors the IP ports defined in respective entries of the file 309. The file 309 also defines what action should be taken when a file is received via each of the defined ports. Accordingly, when data is received via a given port then at step 503 the network printing program 213 determines the appropriate action to be taken with the data. If the file 309 indicates

that data received on a given port should be sent directly to a printer then this is carried out at step 505 after which the network printing program 213 returns to monitoring the IP ports 217 at step 501.

If the port entry in the file 309 determines that a received data should not be sent directly to a printer then, at step 507, the network printing program 213 opens the file containing the data and inspects the first line for a file extension. If at step 509 the file extension is identified as "csv" then, at step 511, the program 213 saves the file with the extension appended and sends a command to the operating system to execute the file. The network printing program 213 then returns to step 501 to monitor the IP ports 217. If at step 513 the file extension is identified as "txt" then at step 515 the program 213 saves the file with the extension appended, sends a command to the operating system to execute the file and returns to step 501 to monitor the ports 217. If at step 517 the file extension is identified as "htm" then at step 519 the program 213 saves the file with the extension appended, sends a command to the operating system to execute the file and then returns to step 501 to monitor the ports 217. If at step 521 the file extension of the received file is identified as "doc" then at step 523 the program 213 saves the file with the extension appended, sends a command to the operating system to execute the file and then returns to step 501 to monitor the ports 217. If, in the file extension recognition steps 509, 513, 517, 521 no extension is recognised then, at step 525, the program 213 saves the file with the extension "txt" appended, sends a command to the operating system to execute the file and then returns to step 501 to monitor the ports 217. The result of executing the file is that file will be opened using the associated application program i.e. Excel for "csv", Word for "doc", Notepad for "txt" and an the preferred internet browser for "htm" (the program associated with a given file extension may be specified by the user in some operating systems).

As described above, once the print request made by the user has been received by the client computer 119, the data will have either been sent to a local printer or presented to the user via an application program. In the case of the local printer this is one that is defined by the printer options set by the user on the client computer as opposed to any printer settings defined on the server computer. This removes the need for the server computer to be configured with the details, locations

and driver programs for all the printers on the network. This is a difficult task to achieve when the network is not small. When printers can be moved on the network or even removed from it easily the task of maintaining printer configuration details becomes more difficult. Since the printer configuration settings are defined on the client computer they are no longer the responsibility of the server computer administrator and instead can be modified whenever necessary by the user in accordance with the local printer configurations and availability. This is of particular advantage when the client computer is mobile i.e. can be moved readily between physical locations and be connected to the network at any one of those locations.

When the print request results in a particular application program being used to open the data file then this provides further advantages. For example, it avoids the need for the user to have any printing facilities available and removes the delay of physically printing the document. This is of particular advantage where the user needs to work on the document in an electronic form e.g. to edit or e-mail it.

In the system described above with reference to Figures 4 and 5 the user is able to select (at step 403) from one of three printers and a single application as determined by the contents of the settings file 307 stored on the server 107 for the particular user. If the user wishes to change these setting the file 307 this can be accomplished either by directly editing the settings file 307 or by a suitable interface facility such as a control panel. In the present embodiment there are four ports reserved for use by the network printing programs 211, 213 and therefore the number of printers/applications is limited to this number (however it will be appreciated that more ports could be provided by adding further entries to 307).

In order to change the options presented to the user, the first field of one or more of the entries in the settings file 307 is modified. If the new setting is for a printer the field should contain a recognised printer name such as "LPT1" or "COM1" so that the entry is properly recognised in step 403. If an application is to be specified then the application name should be entered in the first field of the appropriate line in the file 307. The system can be set up for a combination of printers or applications or exclusively for printer or for applications.

When the file 307 has been amended, the entries in the client file 309 can also be amended for the corresponding ports. In other words, for each port defined in the client settings file 309, the instruction (to send the file to a printer or to open with a predetermined application program) can be amended to correspond to the function defined in the first field of the entry for that port in the settings file 307 on the server 107. However, it is not essential that the settings in the file 309 correspond to those in file 307. For example it is also possible for a user to assign what is shown in file 309 as a printer port to a specific application program simply by appropriate editing of file 309.

Although the embodiment above is arranged to either send a file received by the client computer 119 directly to a printer or open it with an application further alternative actions are possible. For example, the file could be received and then processed using a batch processing file. Such batch files can be used to carry out many types of processing such as editing, sending to another location (by e-mail, file transfer, facsimile or any other suitable method) for compressing or for archiving. Such a batch file would be referred to by a command entered in the appropriate line of the client settings file 309.

The data file 301 described above also contains a reference to the settings file 307 for the user as well as the IP address. As an alternative, the setting file could be applicable to all users and therefore no reference would be required to the settings file 307 in file 301. A further alternative would be for the client computer to send the settings file from the client to update a user-specific settings file on the server.

In the embodiment described above, the server network printing program 211 is described as a single program. However, as an alternative, a separate program can be run for each of the possible choices in the settings file 307. In this case, each version is set up to deal with either a request to print to a printer or to carry out network printing in accordance with the invention. Each of the network printing programs can be arranged to present itself to the user as a normal printer.

Although the embodiment above is described using the VMS operating system and PC client computers, it will be clear to those skilled in the art that the invention is applicable to any server based operating system and its associated client systems.

In some circumstance it would be appropriate to ensure that the files being transferred between the client and the server 107, 119 could not be altered or read by an unauthorised party. In this case, encryption techniques can be applied to the data transfer. A mechanism for improving the security that is implemented in the above embodiment is to limit the set of file extensions that the client computer will accept. This reduces the possibility of undesirable files such as executable files being transmitted to the client computer 119.

As will be understood by those skilled in the art, the network printing programmes 211, 213 both together and independently embody aspects of the invention. These programmes 211, 213 can be contained on various transmission and/or storage mediums such as a floppy disc, CD-ROM, or magnetic tape so that the programmes can be loaded onto one or more general purpose computers or could be downloaded over a computer network using a suitable transmission medium.

Unless the context clearly requires otherwise, throughout the description and the claims, the words "comprise", "comprising" and the like are to be construed in an inclusive as opposed to an exclusive or exhaustive sense; that is to say, in the sense of "including, but not limited to".

CLAIMS

1. A method of processing data for performing a printing operation in response to a print request made by a first computer to a second computer in a network of computers, the method comprising the steps of:

i) at said second computer:

a) accessing stored data associating one or more printer identifiers and/or application program identifiers with each member of a set of network address ports;

b) receiving a print request from said first computer, said request comprising an identification of one of said stored printer identifiers or application program identifiers;

c) identifying the network address of said first computer; and

d) sending data required for said print request to the network address of the first computer, using the port associated with the printer identifier or application program identifiers identified in the request; and

ii) at said first computer:

a) accessing stored data defining an association between each member of the set of network address ports and a printer and/or application program; and

b) in response to data being received via one of said ports, sending the received data to the printer or application program associated, in accordance with said stored data, with the network port from which the data was received.

2. A method according to claim 1 in which at step c) at said first computer:

in response to data being received via one of said ports associated, in accordance with said stored data, with a printer, sending the received data to that printer; and

in response to data being received via one of said ports associated, in accordance with said stored data, with an application program, causing said data to be displayed using that application program.

3. A method according to claims 1 or 2 in which at step d) at said second computer:

sending the data required for said print request to the network address of the first computer, using the port associated with printer name or application program name identified in the request; and

in response to said request identifying an application program name, sending and identification of the type of data being sent in addition to the data itself.

4. A method according to any preceding claim in which the stored data accessed by said first computer associates only printers with each of said set of network address ports and said stored data accessed by said second computer associates only printer names with each of said set of network address ports.

5. A method according to any of claims 1 to 3 in which the stored data accessed by said first computer associates only application programs with each of said predetermined set of network address ports and said stored data accessed by said second computer associates only application program names with each of said set of network address ports.

6. A method according to any of claims 1 to 3 and 5 in which, instead of the received data being sent to a printer or application program the data is compressed and/or stored and/or transmitted to another computer.

7. A method according to claims 3 to 6 further comprising the step at said first computer of only accepting data from a predetermined set of data types.

8. A method according to any preceding claim further comprising the steps of:
encrypting the data before sending it to the first computer; and
decrypting the data received at said first computer.

9. A method of processing data for performing a printing operation in response to a request made by a first computer to a second computer in a network of computers, the method comprising the steps of:
at said first computer:

a) accessing stored data defining an association between each member of a set of network address ports and a printer and/or application program;

b) in response to data being received via one of said ports associated in accordance with said stored data with a printer, sending the received data to that printer; and

c) in response to data being received via one of said ports associated, in accordance with said stored data, with an application program, causing said data to be displayed using that application program.

10. A method of processing data for performing a printing operation in response to a print request made by a first computer to a second computer in a network of computers, the method comprising the steps of:

at said second computer:

a) accessing stored data associating one or more printer identifiers and/or application program identifiers with each member of a set of network address ports;

b) receiving a print request from said first computer, said request comprising an identification of one of said stored printer identifiers or application program identifiers;

c) identifying the network address of said first computer;

d) sending the data required for said print request to the network address of the first computer, using the port associated with printer identifier or application program identifier identified in the request; and

e) in response to said request identifying an application program identifier, sending and identification of the type of data being sent in addition to the data itself.

11. A data carrier carrying instructions for enabling a computing apparatus to carry out the method of any one of claims 1 to 10.

Figure 1

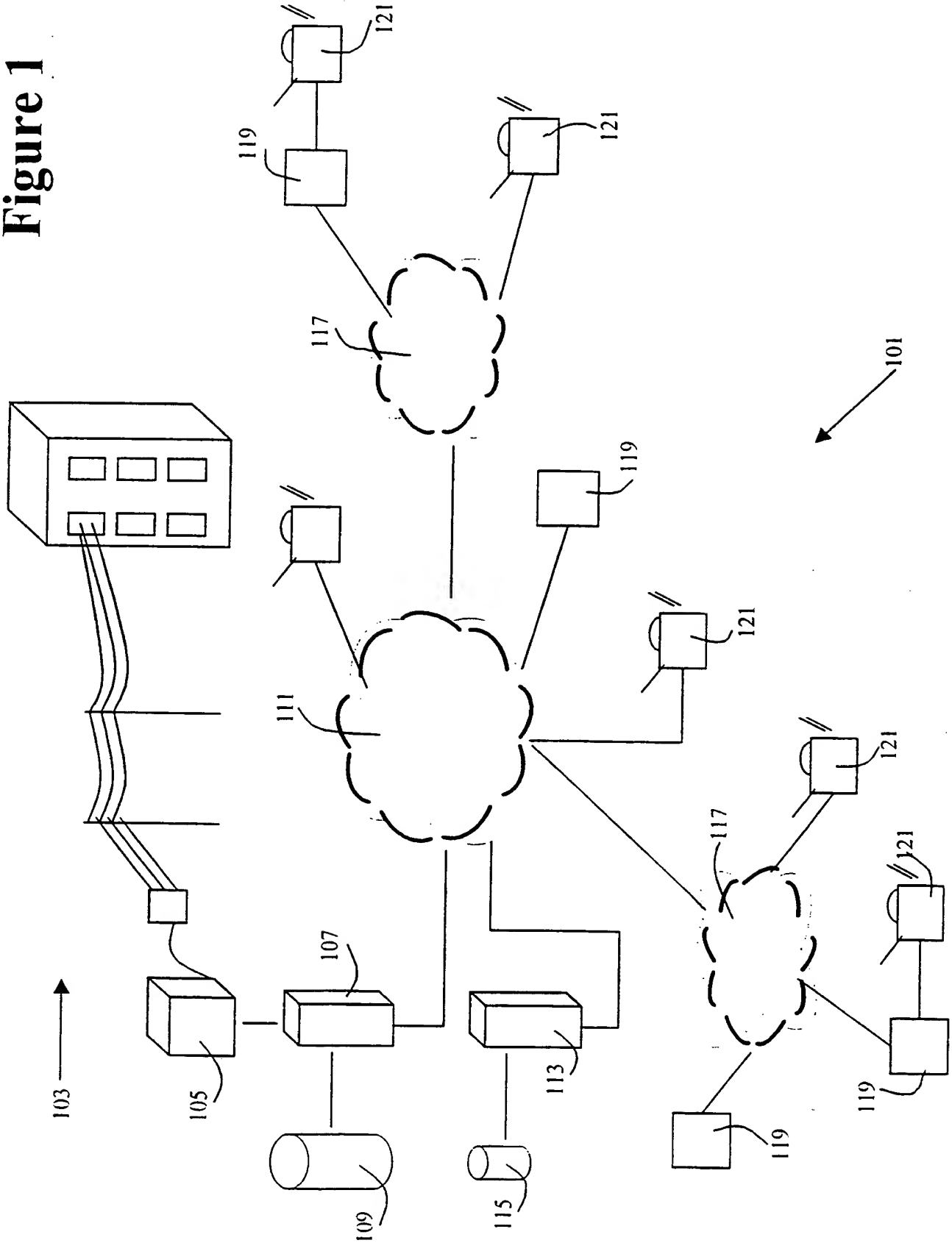


Figure 2

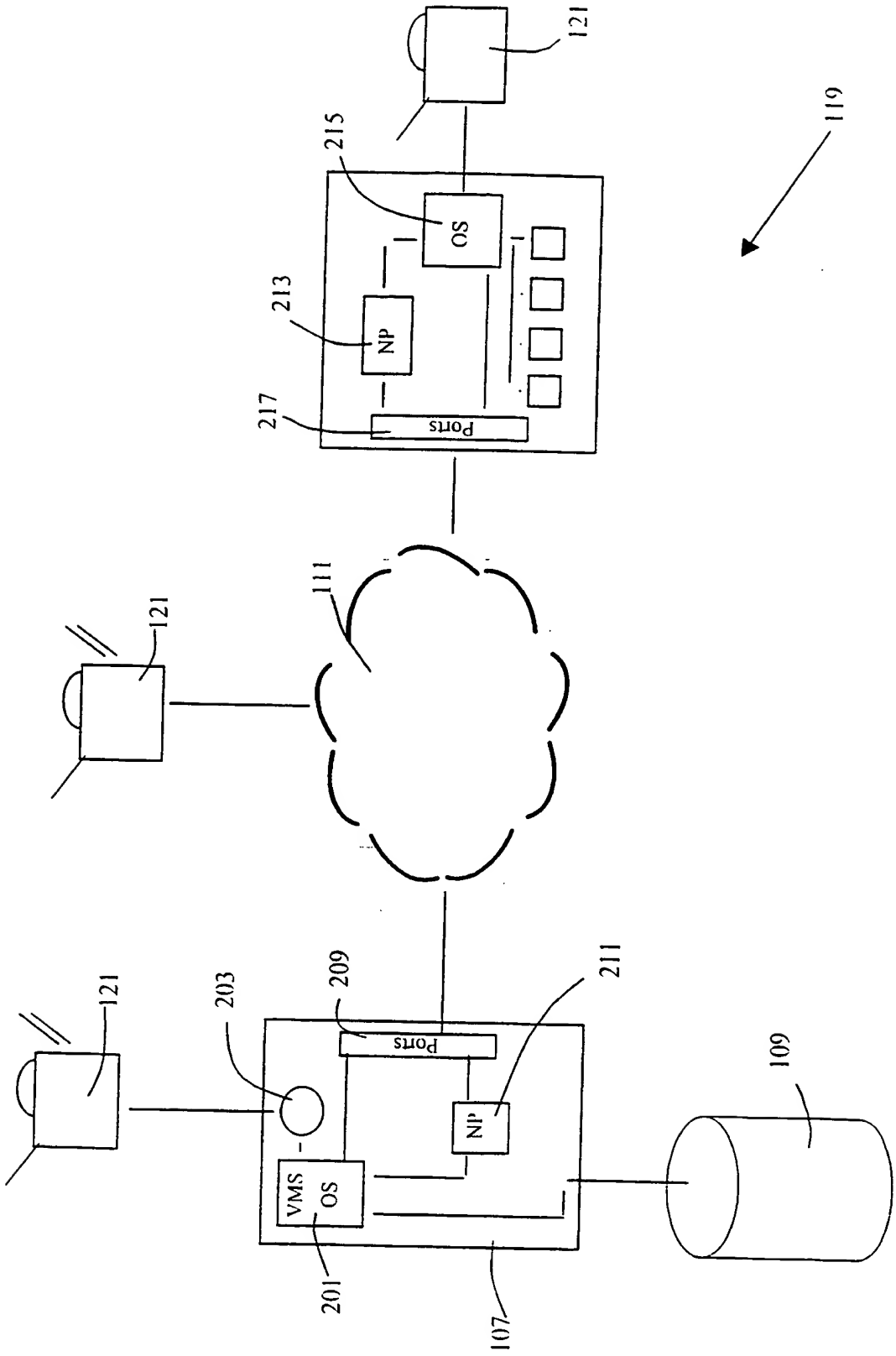

121
215
OS
119
213
NP
217
Ports
111
121
121
203
209
211
Ports
109
NP
VMS
OS
201
107

Figure 3

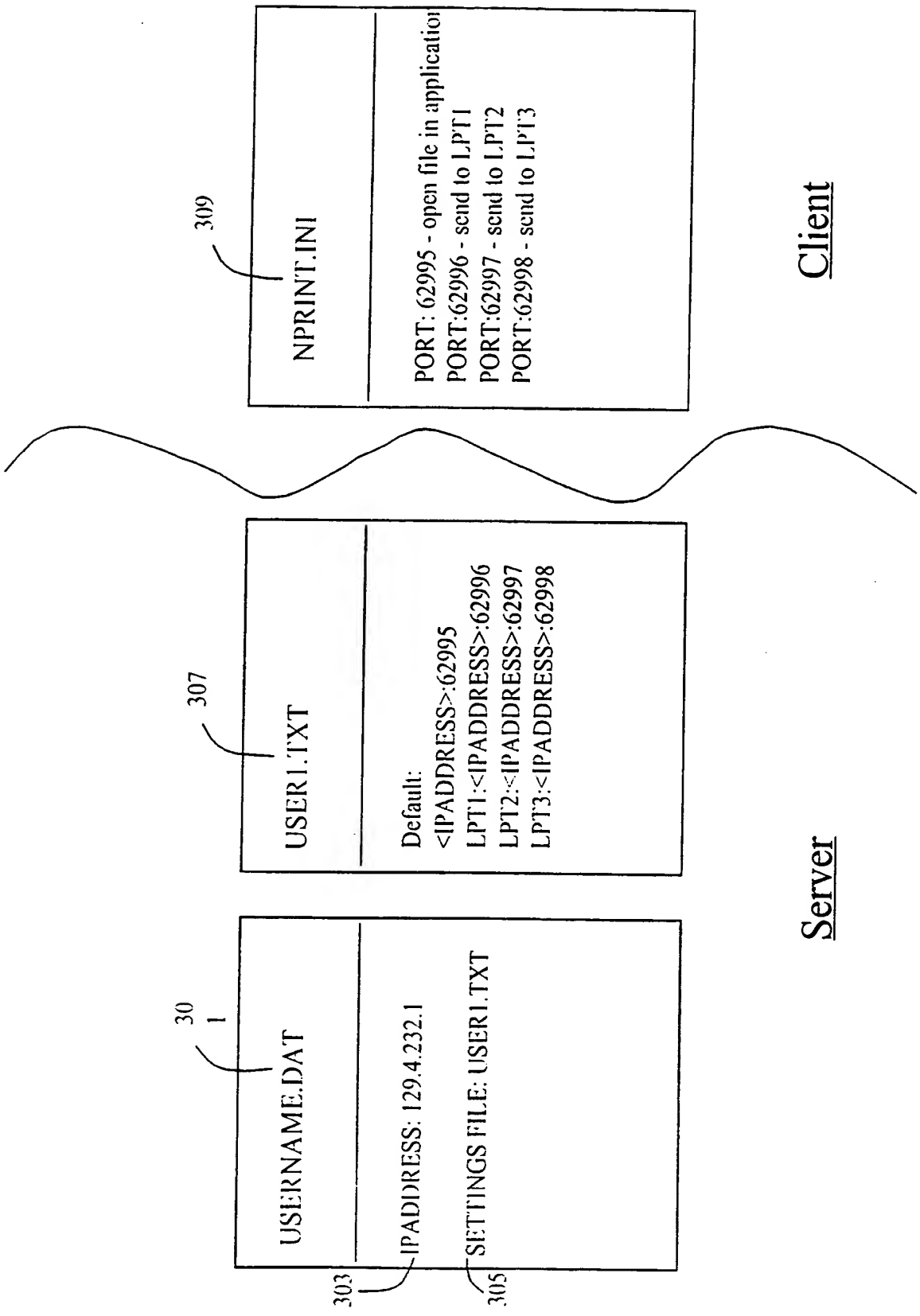

Client
Server
NPRINT.INI
PORT: 62995 - open file in application
PORT:62996 - send to LPT1
PORT:62997 - send to LPT2
PORT:62998 - send to LPT3
309
USER1.TXT
Default:
<IPADDRESS>:62995
LPT1:<IPADDRESS>:62996
LPT2:<IPADDRESS>:62997
LPT3:<IPADDRESS>:62998
307
USERNAME.DAT
IPADDRESS: 129.4.232.1
SETTINGS FILE: USER1.TXT
301
303
305

Figure 4

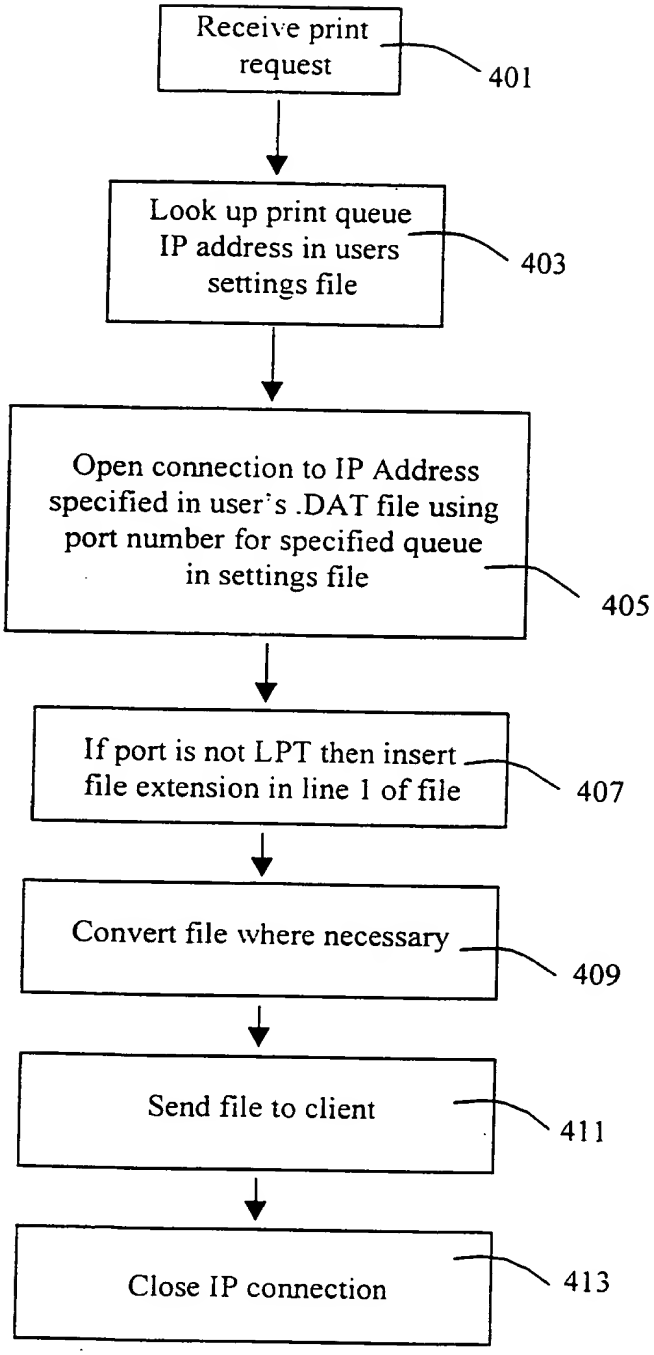
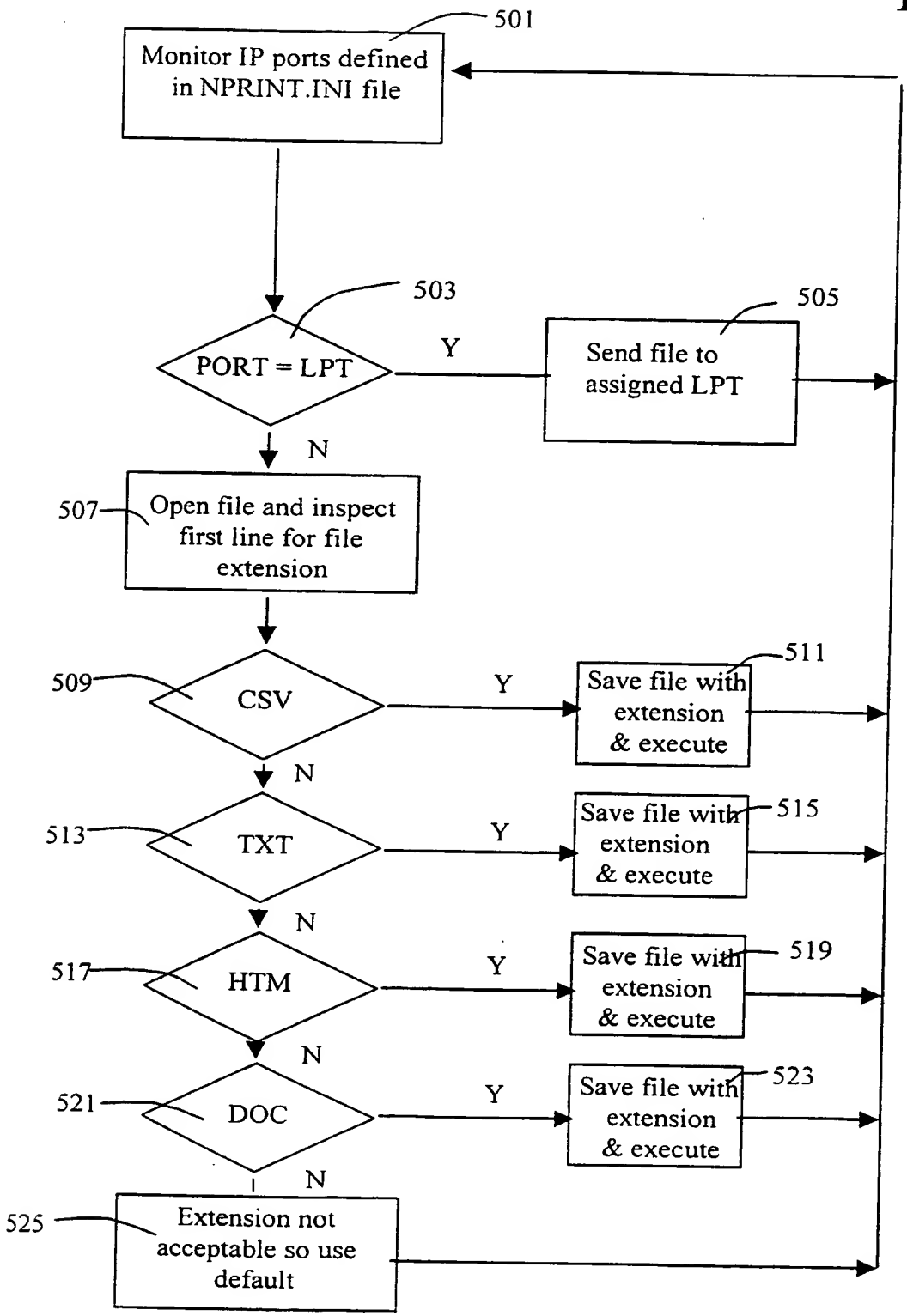

Receive print request
401
Look up print queue IP address in users settings file
403
Open connection to IP Address specified in user's .DAT file using port number for specified queue in settings file
405
If port is not LPT then insert file extension in line 1 of file
407
Convert file where necessary
409
Send file to client
411
Close IP connection
413

Figure 5


501
Monitor IP ports defined in NPRINT.INI file
503
PORT = LPT
Y
505
Send file to assigned LPT
N
507
Open file and inspect first line for file extension
509
CSV
Y
511
Save file with extension & execute
N
513
TXT
Y
515
Save file with extension & execute
N
517
HTM
Y
519
Save file with extension & execute
N
521
DOC
Y
523
Save file with extension & execute
N
525
Extension not acceptable so use default

INTERNATIONAL SEARCH REPORT

Intern al Application No
PCT/GB 00/00900

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G06F3/12

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 G06F G06K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 802 260 A (SHIOTANI TAKAHIRO ET AL) 1 September 1998 (1998-09-01) figures 1-5 column 3, line 18 -column 8, line 11	1-3,9-11
A	WO 96 39656 A (APPLE COMPUTER) 12 December 1996 (1996-12-12) figures 2,6,7 page 5, line 6 -page 11, line 13 page 13, line 9 -page 15, line 24	1,3,9,10

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
13 June 2000	19/06/2000

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Weiss, P

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Information on patent family members

Interi nal Application No
PCT/GB 00/00900

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5802260 A	01-09-1998	JP 8152981 A	11-06-1996
WO 9639656 A	12-12-1996	US 5787237 A	28-07-1998
		AU 6251696 A	24-12-1996
		US 5867636 A	02-02-1999
		US 5754747 A	19-05-1998